



# Arctic User's Manual

Arctic GPRS Gateway



Version 1.5  
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### Revision History:

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10/2005 General text related corrections / Chapter 5 - Firewall rewritten Version 1.4  
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## Declaration of Conformity

(according to ISO/IEC Guide 22 and EN 45014)

**Manufacturer's Name:**

Viola Systems Ltd.

**Manufacturer's Address:**

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*declares that this product:*

**Product Name:**

Arctic GPRS Gateway

*conforms to the following standards:*

**EMC:**

**EN 55022 Emission Test (Class A)**

1. Radiated Emissions (30-1000MHz)
2. Conducted Emissions (0.15-30MHz)

**EN 50082-1 Immunity Test**

1. IEC 801-3: Radio Frequency Electromagnetic Field
2. IEC 801-2: Electrostatic Discharge
3. IEC 801-4: Fast Transients, AC Power Ports and Signal cables

**Supplementary Information:**

*"The product complies with the requirements of the Low Voltage Directive 73/23/EEC and EMC directive 89/336/EEC."*

*Warning: This is a Class A product. In a domestic environment this product may cause radio Interference which may make it necessary for the user to take adequate measures.*

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## Warranty and Safety Instructions

Read these safety instructions carefully before using the products mentioned in this manual:

Warranty will be void if the product is used in any way in contradiction with the instructions given in this manual or if the product has been tampered with.

The devices mentioned in this manual are to be used only according to the instructions described in this manual. Faultless and safe operation of the devices can be guaranteed only if the transport, storage, operation and handling of the devices is appropriate. This also applies to the maintenance of the products.

To prevent damage both the product and any terminal devices must always be switched OFF before connecting or disconnecting any cables. It should be ascertained that different devices used have the same ground potential. Before connecting any power cables the output voltage of the power supply should be checked.

This product is not fault-tolerant and is not designed, manufactured or intended for use or resale as on-line control equipment or as part of such equipment in any hazardous environment requiring fail-safe performance, such as in the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct life support machines, or weapons systems, in which the failure of Viola Systems manufactured hardware or software could lead directly to death, personal injury, or severe physical or environmental damage.

# Contents

Copyright and Trademark .....	2
Disclaimer and Revisions .....	3
Declaration of Conformity .....	4
Warranty and Safety Instructions .....	5
Contents .....	6
1. Introduction .....	7
About this User's Manual .....	7
The Arctic Platform .....	8
2. Physical Interfaces .....	9
Front Panel Description .....	9
Side Panel Description .....	13
Back Panel Description .....	13
Product Information Label .....	14
Firmware Version .....	14
3. Getting Started .....	15
Unpacking the Arctic .....	15
Installation of the Arctic .....	15
Setting of the IP Address Using a Console .....	16
Setting of the IP Address Using an HTML Browser .....	17
4. Arctic Configurator Tool .....	18
Login to Arctic Configurator .....	18
General Usage of the Arctic Configurator .....	18
5. Arctic Software Configuration .....	19
System Menu .....	19
Network Menu .....	19
Firewall Menu .....	23
Service Menu .....	23
Application Menu .....	25
Tools Menu .....	25
Default settings .....	25
6. I/O Interface (optional) .....	26
Digital Inputs (IO-8-2 and IO-8-1-1 only) .....	26
Digital Outputs (IO-8-2 and IO-8-1-1 only) .....	26
DC Output .....	27
Analog Input (IO-8-1-1 only) .....	27
7. GPRS .....	28
Placing Arctic GPRS .....	28
GPRS Antenna .....	28
SIM Card and Card Holder .....	29
Configuring Arctic GPRS Settings .....	29
Useful GSM/GPRS Information .....	30
Troubleshooting .....	31
Common Problems .....	31
Technical Specifications .....	32
Absolute Maximum Ratings for I/O Interface .....	32
Limited Warranty .....	33
Coverage .....	33
Excluded Products and Problems .....	33
Remedies .....	33
Obtaining Warranty Service .....	33
Technical Support .....	34
Contacting Technical Support .....	34
Recording Arctic Information .....	34

# 1. Introduction

Viola Arctic product family offers industrial quality connectivity devices for custom-built wireless and wired device management solutions.

## About this User's Manual

This User's Manual describes the operation of the Arctic products. All devices in this User's Manual are referred to as Arctic, unless otherwise mentioned. This manual provides introductory information as well as detailed instructions on how to set up and manage the Arctic as part of a network environment. It is intended for anyone involved in installing and managing Arctic devices. It is assumed that the reader of this manual is familiar with basic working principles of Internet technology.



## The Arctic Platform

The Arctic platform utilizes a number of wireless or fixed line interfaces depending on your specific requirements. Arctic is a customizable technology allowing users to develop solutions for their own applications. Arctic devices have been designed to withstand the requirements of extreme environments and industrial use.

### Technical Features Summary

The Arctic is available with various networking and I/O options. The following table shows the functional components in the Arctic platform. Details of each component are also listed below.

#### **HARDWARE**

##### **CPU Platform:**

- 32-bit RISC microcontroller
- 32 MB RAM
- 8 MB Solid state FLASH memory

##### **Network Interface**

- 10/100 Base-T Ethernet (RJ45)

##### **Device Interface**

- 2 Serial ports (RS-232, RS-485)

##### **Mechanics**

- Aluminum frame
- Attachment rail for optional and custom mounting tools

#### **SOFTWARE**

##### **Operating System**

- Multitasking embedded  $\mu$ CLinux

##### **Supported Protocols**

- PPP, IP, ICMP, UDP, TCP, ARP, DNS, DHCP, FTP, TFTP, HTTP

#### **Application Services**

- HTTP server, CGI
- FTP client
- Telnet server
- SSH server and client
- Temperature sensor
- Real Time Clock
- Syslog
- DHCP server and client
- Status querying using SMS
- Serial connection (Serial GW)

#### **Manufacturing Options:**

- I/O-board
- Backup Battery

#### **Management and Configuration:**

- Web user interface
- Console port
- Telnet

## 2. Physical Interfaces

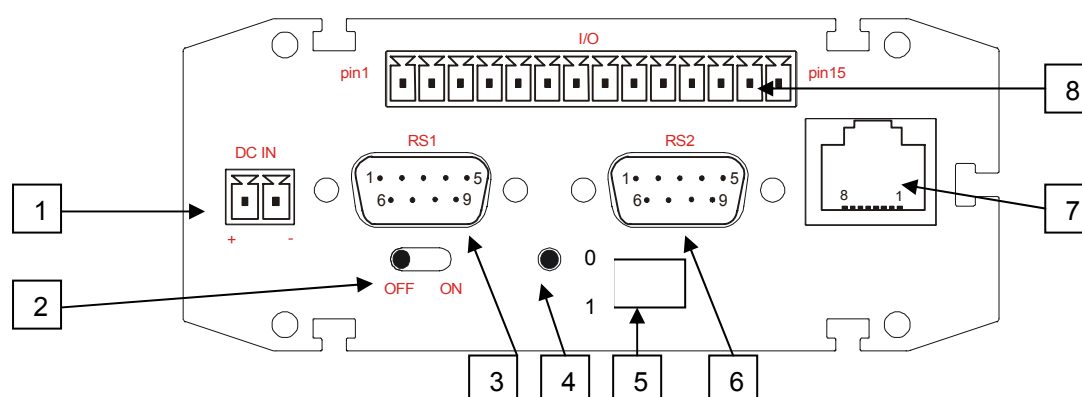
Depending on the model, the Arctic unit contains two or three panels for interface connections and status indication. These panels are:

1. Front panel. An example of a typical configuration is shown in the top figure. This panel includes all connectors and switches for the device operation, optional input/output connectors and the connectors for network and serial interface.
2. Back panel. The GPRS antenna connector and SIM card holder are shown in bottom figure.
3. Side panel. The side panel contains all LEDs which indicate the status of the device.



### Front Panel Description

The front panel of the Arctic consists of the following connectors and switches:



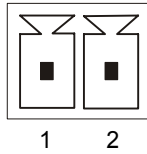
- |                              |                                  |
|------------------------------|----------------------------------|
| 1. Power supply connector    | 5. DIP switches                  |
| 2. Power switch              | 6. Application serial port (RS2) |
| 3. Console serial port (RS1) | 7. Ethernet connector            |
| 4. Console switch            | 8. I/O connector (optional)      |

**Note:** Some of the connectors are present only with specific manufacturing options.

The Arctic has rails to enable wall or rack mounting. The front panel contains slots for nuts or other mounting accessories (optional) in order to gain access to these rails.

### Power Supply Connector

The Arctic has a 6 – 26 VDC power supply connector shown below:



Pin 1 is positive (+)  
Pin 2 is negative (–)

The unit is protected against reversed polarity.

### Power Switch

Enables or disables the operation of the Arctic.

### Console Enable Switch

Enables or disables console access. When it is disabled, both serial ports may be used as an application serial port. When the switch is in the right position, RS1 is in serial port mode and when in the left position, RS1 is in console mode.

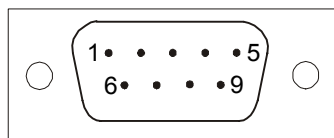
### DIP Switches

Selects application port (RS-2) mode and settings (RS-232 or RS-485). By default all are set to “0” when the port is acting as an RS-232. DIP switches 2-4 apply only when RS-485 mode is selected by DIP switch 1.

Number	Function	State	Explanation
1	RS-232/RS-485	“0” = RS-232, “1” = RS-485	Selects RS-port operation
2	HALF/FULL	“0” = full “1” = half	Selects between half-duplex (2-wire) and full-duplex (4-wire)
3	BIAS	“0” = OFF “1” = ON	RS-485 biasing
4	TERMINATION	“0” = OFF “1” = ON	RS-485 termination

## Serial Ports (RS-232, RS-422/485 -connectors)

Arctic has two serial port connectors. These are 9-pin male connectors (DB9). A null modem cable may be used to connect the Arctic to a serial device or a PC. The Arctic supports CTS/RTS flow control. The figure of Arctic's DB9 (DTE) Male connector is shown below:



The serial port 1 (RS1) is a full RS-232 -port. The pin description of this port is as follows:

Pin Number	Name	Direction	Explanation
1	DCD	IN	Data Carrier Detect
2	RXD	IN	Received Data
3	TXD	OUT	Transmitted Data
4	DTR	OUT	Data Terminal Ready. Handshake output
5	GND	-	Signal ground.
6	DSR	IN	Data Set Ready. Handshake input
7	RTS	OUT	Ready To Send. Handshake output
8	CTS	IN	Clear To Send. Handshake input
9	RI	IN	Ring Indicator

The serial port 2 (RS2) can be configured either as a half RS-232 or an RS-422/485 (DTE Master). Pin description is same as in RS1, when in RS-232 mode. The pin description of this port is as follows in RS-485 mode.

Pin Number	RS-485, Full duplex (4-wire)	RS-485 Half duplex (2-wire)
1	NC	NC
2	RXD+ (in)	NC
3	TXD-(out)	TXD/RXD- (out/in)
4	NC	NC
5	GND	GND
6	NC	NC
7	TXD+ (out)	TXD/RXD+ (out/in)
8	RXD-(in)	NC
9	NC	NC

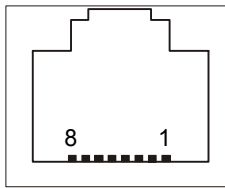
**Note:** Make sure that you DO NOT connect RS-422 or RS-485 devices to a port which has been configured to operate as an RS-232 port.

## Ethernet Connector

Arctic has an RJ45 connector for 10/100 Mbps Ethernet connection. Maximum length of the Ethernet cable is 100m.

*Note:* The cross-connected cable is only for connecting the Arctic to the PC's network interface card. When connecting to a local network (e.g. hub or switch), a direct Ethernet cable must be used.

The figure and pin description of the Arctic's RJ45 Ethernet connector is as follows:



Pin Number	Name	Direction	Explanation
1	Rx+	IN	Data Receive Positive
2	Rx-	IN	Data Receive Negative
3	Tx+	OUT	Data Transmit Positive
4	NC		
5	NC		
6	Tx-	OUT	Data Transmit Negative
7	NC		
8	NC		

## I/O Connector (optional)

The Arctic is available with 2 different (manufacturing option) I/O connectors. The basic configuration consists of 8 digital inputs, 2 digital outputs (see Chapter 6).

## Side Panel Description

The side panel of the device contains all LEDs which are used to indicate the status of the Arctic. The LEDs are numbered from 1 to 10 starting from the rear panel side. A detailed description of each LED is listed below:

LED number	LED Name	LEDs state	Description
1	Battery Error		Backup battery status (optional)
2	Status		
3	Power/Error	Green	Power switched ON
		Not lit	No power
		Red	
4	Function	Green, Blinking	Watchdog operation OK
5	Collision	Off	Normal operation
		Green, Blinking	Network collision
6	Activity	Steady On	Operation voltage connected
		Green, Blinking	Packets received from the network
7	---red/green1		
8	---red/green 2		
9	---red/green 3		
10	GPRS	Off	No GPRS/GSM traffic
		Green, blinking	GPRS traffic
		Red, blinking	

## Back Panel Description

The Arctic GPRS Gateway has an antenna connector and a slot for a SIM card on the back panel.

1. FME connector for an antenna.
2. SIM Card slot.

**Note:** It is recommended NOT to insert or remove the SIM card while the GPRS module is in operation. The SIM card contents may become corrupted if the card is removed while the GPRS module is writing data to it.

## Product Information Label

The product information label on the underside of the Arctic contains the following information:

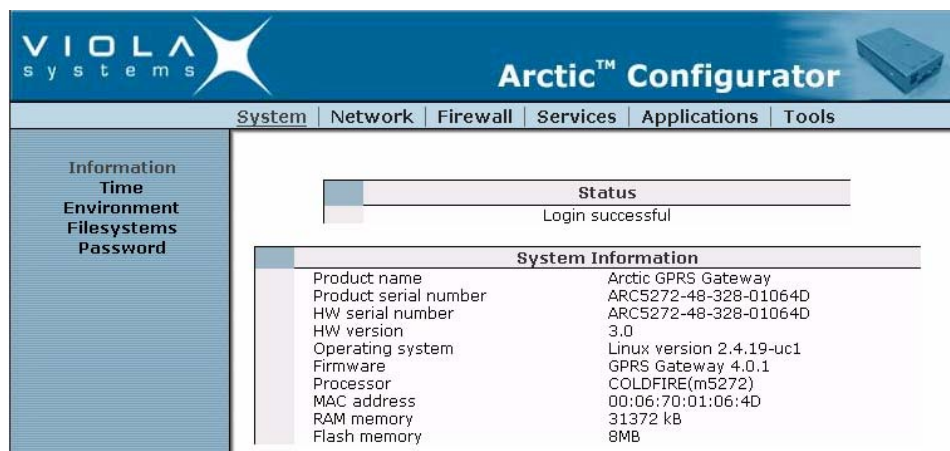
1. Product type
2. Serial number
3. MAC address.

The Ethernet address (MAC address) of the unit is printed on the product label (see below). Each address code starts with the digits "00:06:70", but the remaining six digits are unique for each unit.



## Firmware Version

The Arctic firmware version may be checked from the Viola Configurator startup page. (System/Information). It is also possible to get the firmware version by issuing command *firmware* in console.



## 3. Getting Started

### Unpacking the Arctic

Arctic is delivered in a bulk package containing only the device itself (with possible internal options).

A separate Arctic Accessory Kit (ordered separately) contains the following items:

- Power supply and cable
- Cross-over Ethernet Cable
- Null modem cable.

If any of the items are missing or are damaged, please contact Viola Systems Ltd. All packaging materials are recyclable. Viola Systems urges its customers to follow environmental regulations regarding the disposal of all materials.

### Installation of the Arctic

The Arctic can be installed horizontally on a flat surface e.g. on a desk or a rack.

When installing Arctic models with wireless connectivity options it should be remembered that high-frequency radio waves need to be taken into account. The surrounding environment affects the range of radio signals. Therefore, if you are using an Arctic with antennas directly mounted to the antenna connector, try to avoid placing the Arctic where the radio signal might be disturbed ("shadowed") by nearby obstacles. Also large metallic surfaces (racks) may have a highly detrimental effect on the antenna performance. In case of metal racks or surfaces it is recommended to use an external antenna with an appropriately selected cable. By following these precautions the Arctic may be installed more freely.

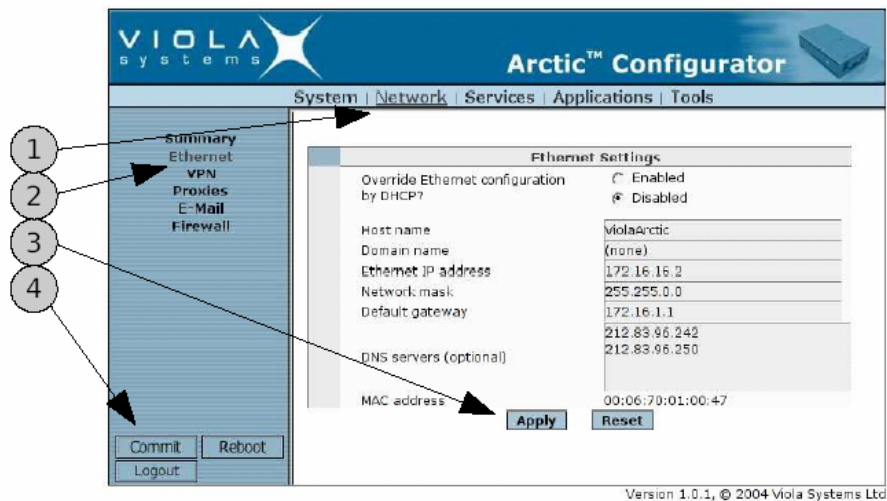
The aluminum case of the Arctic contains rails for wall mounting. Both broad sides contain two rails and the narrow side opposite to the LED panel contains one rail. These rails allow a flexible selection of the optimum mounting direction. To mount the Arctic on a wall using optionally available mounting tools can be used.



## Setting of the IP Address Using an HTML Browser

This is the recommendable way to set up the network parameters. It is an easy-to-apply solution if the computer used for configuration has been properly configured. Follow the procedure listed below:

1. Connect to the Arctic using your HTML browser. The default IP address of the Arctic is "10.10.10.10" (netmask "255.0.0.0").
2. From the initial page click **Start Configurator** and enter login information in the following page. Username is *root* and by default no password is set (just leave the field empty).
3. Navigate to Network page (1 in the picture) and from there to Ethernet subpage (left menu, 2).
4. Enter the IP address (and other network settings) of your choice and click Apply (3) and then Commit (4) to store the settings.
5. Reboot the Arctic for the settings to take effect.



**Note:** Arctic default password is *empty*. Remember to set the password before connecting the Arctic device to a public network.

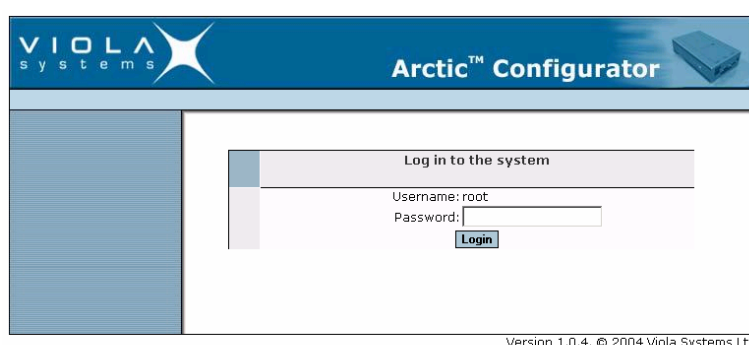
## 4. Arctic Configurator Tool

The Arctic Configurator is a tool which allows the user to manage the properties of the Arctic device by using a user-friendly, www-based interface. You only need a computer with an HTML browser and a working connection to the Arctic to be able to use the web configurator.

With the Arctic Configurator you can set important parameters, receive status information, and set variables that control which applications and processes run on the Arctic board.

### Login to Arctic Configurator

To start using the Arctic Configurator, just open the URL in which the Arctic which you want to configure is located. On the Viola Arctic main page, select the **Start Configurator** link.



First, the Arctic Configurator will ask you for the password for the Arctic device root-account. Enter the correct password in the box provided and press the login-button to start the Arctic Configurator.

**Note:** Default password for root is empty. Remember to set the password before connecting the device to a public network.

### General Usage of the Arctic Configurator

After a successful login, the Arctic Configurator will display the main screen. This consists of the main navigation menu on the top, the secondary navigation bar on the left, and the main screen containing the currently active content and controls.

When first starting the program, the System/Information screen will be shown in the main content area. The main navigation-menu on the top of the screen is used to navigate between the different subsets of settings available. Selecting an item from the main menu will display the available items related to this subset in the secondary navigation bar, selecting the first of these to be shown in the main content area.

The secondary navigation-bar on the left contains the groups of parameters in this subset. Selecting an item from this menu will display the content related to the selected group in the main content area. In the bottom of the secondary navigation-bar is a group of three buttons which are always visible: Commit, Reboot, and Logout. The Commit-button is used to save the memory-resident data for "soft" parameters permanently to disk. Note that the values for the previous parameters are not saved to disk unless the Commit-button is pressed. The Reboot-button, as the name suggests, will reboot the Arctic. The Logout button will end the current session and return to the login-screen.

## 5. Arctic Software Configuration

### System Menu

The System-menu contains items that are relevant to the Arctic board itself. It allows the user to view information about the system or the current executing environment and to set the date and time.

**Information** – submenu contains general information about the Arctic device. Information on this submenu should be provided if possible when contacting Viola Systems technical support.

**Time** – submenu contains time information. Arctic has a real time clock with battery backup and time information may be adjusted here.

**Note:** Updated time data won't be saved permanently until the **Commit** button is pressed. Until then, it will be stored only in RAM memory.

**Environment** – submenu contains information about the Arctic device memory usage, uptime and inside temperature.

**Password** – submenu contains password changing. The default password is blank. When changing the password for the first time, the same password has to be written in all three boxes.

### Network Menu

Through the Network-menu you can access sub items to control the various network interface properties. The menu contains items for Ethernet, VPN and GPRS interfaces. Also Email, Proxy and firewall settings are located in this submenu. Summary page shows which interfaces are up and also routing information:

Network Interface Summary					
<b>Ethernet (eth0)</b>					
Internet address	172.16.4.199				
Status	UP BROADCAST RUNNING MULTICAST				
Rx packets	379				
Tx packets	263				
<b>Loopback (lo)</b>					
Internet address	127.0.0.1				
Status	UP LOOPBACK RUNNING				
Rx packets	0				
Tx packets	0				
<b>Running Routes</b>					
Destination	Gateway	Genmask	Flags	Iface	
172.0.0.0	*	255.0.0.0	U	eth0	
127.0.0.0	*	255.0.0.0	U	lo	
<b>Running ARP cache</b>					
Address	HWtype	HWaddress	Flags	Mask	Iface
172.16.4.15	ether	00:06:5B:C0:59:27	C		eth0

### Ethernet

Configuration for the Arctic Ethernet Interface:

**Override Ethernet configuration by DHCP** – If this parameter is Enabled Arctic gets the IP address and other related information from a local DHCP server. When enabled, all other settings are disabled on this page.

**Host name** – Sets the Arctic device hostname. This is important to set up correctly when using a Viola M2M Gateway and VPN.

**Domain name** – Domain name for name resolution.

**Ethernet IP address** – IP address used by *eth0* interface.

**Network mask** – Network mask used by *eth0* interface

**Default gateway** – Default gateway used when the direct route to host or network is not know. This parameter applies to *eth0* interface only. When GPRS or VPN is used as default gateway this parameter has to be set to 0.

**DNS servers** - Name server IP address for resolving host names to IP address and vice versa.

## GPRS

GPRS settings include APN and other settings for GPRS network connectivity. More details of GPRS connectivity is in Chapter 7.

**GPRS enabled** – When set to yes, GPRS interface is automatically attached to GPRS network.

**Access Point Name (GPRS)** – GPRS APN name where the connection is made.

**PIN code**– SIM card pin code.

**Led indication** – In Data only mode GPRS LED blinks green when transmitting data. In Informative mode LED blinks also when connected to GPRS network without data transfer (GPRS context is active).

**GPRS username** – Username used for authentication if APN requires it.

**GPRS password** – Password used for authentication if APN requires it.

**PPP idle timeout** – Maximum idle time for GPRS interface. If interface has been idle for this period, the GPRS connection is restarted.

**Maximum MTU value** – Maximum transfer unit for GPRS.

**Default route** – If enabled, GPRS is used as default route. Ethernet default gateway has to be set to 0.

## Dial-in

Configuration for the Arctic PPP dial-in Interface.

**Dial-in enabled** – When enabled, PPP connections can be made to Arctic (GSM data).

**Require authentication (PAP)** When set to yes password authentication is used for incoming data calls.

**Required username** – PAP username allowed login.

**Required password** – PAP password used for authentication.

**Idle timeout** – Idle time before PPP connection is terminated.

**Local IP address** – IP address used in PPP peer.

**Peer's IP address** – IP address used in PPP peer.

## SSH-VPN

Arctic has a VPN client that can be used with the Viola M2M Gateway. For VPN configuration, please refer to the Viola M2M Gateway User's Manual.

The screenshot shows the Arctic Configurator web interface. The top navigation bar includes tabs for System, Network, Firewall, Services, Applications, and Tools. The left sidebar contains a menu with options: Summary, Ethernet, GPRS, Dial-in, SSH-VPN (selected), L2TP-VPN, Monitor, Routing, S-NAT, D-NAT, DNS Update, and SMS Config. The main content area is titled 'SSH-VPN Settings' and contains the following fields:

- Use SSH-VPN?: No (dropdown)
- Interface: GPRS (dropdown)
- Default Route: ☐ Enabled, ☒ Disabled
- Tunnel server IP: 127.0.0.1
- Tunnel server port: 22
- Tunnel server GW: 0
- Routing mode: None (dropdown)
- Remote network IP: 0.0.0.0
- Remote network mask: 255.255.0.0

At the bottom of the settings section are 'Apply' and 'Reset' buttons. Below this is a 'Key management' section with the following fields:

- Local SSH public key: 1024 35 1405100993331995295246943
- Server SSH key entry: (Cannot open the SSH known hosts file, /ssh/known\_hosts)
- Retrieve SSH server key for 127.0.0.1: Retrieve button
- Insert SSH server key for 127.0.0.1: Insert button

## L2TP-VPN

Arctic has a L2TP client that can be used with L2TP server.

The screenshot shows the Arctic Configurator web interface. The top navigation bar includes tabs for System, Network, Firewall, Services, Applications, and Tools. The left sidebar contains a menu with options: Summary, Ethernet, GPRS, Dial-in, SSH-VPN, L2TP-VPN (selected), Monitor, Routing, S-NAT, D-NAT, DNS Update, and SMS Config. The main content area is titled 'L2TP-VPN Settings' and contains the following fields:

- Use L2TP-VPN?: No (dropdown)
- Interface: GPRS (dropdown)
- Default Route: ☐ Enabled, ☒ Disabled
- L2TP server IP: 0.0.0.0
- L2TP server port: 1701
- L2TP server gateway: 0
- Routing mode: None (dropdown)
- Remote network IP: 10.10.0.0
- Remote network mask: 255.255.0.0
- L2TP username: lftp
- L2TP password: pass
- Hello interval (secs): 60

At the bottom of the settings section are 'Apply' and 'Reset' buttons.

## Monitor

Monitor is used for GPRS and VPN connection checking. If connection to the selected IP address is lost, the connection is restarted. Monitor uses ICMP echo (ping) packets to check the connection.

**ICMP Echo sending** – Selects if the monitor is enabled.

**Interval (sec)** – Determines how often the connection is checked by sending ICMP echo packets.

**Reply timeout (secs)** – The waiting time for reply packets.

**Retries timeout (secs)** – The number of tries before connections are restarted.

**Target IP address** – The host IP address to which echo packets are sent to.

**Secondary target IP address** – The secondary host IP address to which ICMP echo packets are to be sent if the sending to primary target host IP address fails.

## Routing

These parameters are used to configure routing settings:

**Act as router** – Enables IP forwarding between interfaces.

**Use Proxy ARP** – Enables proxy ARP. May be used with Viola M2M Gateway VPN.

## S-NAT

These parameters are used to configure S-NAT (source network address translation) settings. When enabled, private IP address used in local LAN is changed to GPRS interface IP address.

**From IP** – Only S-NAT connections from the defined IP address are accepted. If defined with wildcard (0/0), all IP addresses are handled the same way (only S-NAT connections are allowed).

## D-NAT

These parameters are used to configure D-NAT (destination network address translation) settings. When enabled, packets coming to defined GPRS interface port are forwarded to local IP address.

**Source IP** – D-NAT only connections coming from IP. Wildcard 0/0 means all IP addresses are D-NATted.

**Protocol** – Chooses which protocol is port forwarded. If “ANY” is chosen, other parameters are disregarded.

**Dest.port** – Chooses which GPRS interface is port forwarded to local Ethernet.

**Redirect to IP** – Chooses where port forwarding is done to.

**Redir. port** – Chooses which port port forwarding goes to.

## DNS Update

These parameters are used to configure dynamic DNS. Arctic can report it's dynamic IP address to a DNS server.

DNS Update settings	
Enable	No
Record TTL (seconds)	1200
Record refresh interval(seconds)	1000
Zone	exampledomain.com
Authoritative name server address	0.0.0.0
Our domain name	arctic.exampledomain.com
Use Transaction Signatures (TSIG)	No
TSIG key name	key.exampledomain.com
TSIG key value	

## SMS Config

This feature may be used to monitor the Arctic status and to issue simple commands remotely via SMS messages. For detailed information, refer to "SMS Config Application Note".

**Enabled** - Selects whether the SMS Config function is enabled or disabled.

## Firewall Menu

Through the Firewall-menu you can configure built-in firewall of the Arctic. Firewall can be disabled or enabled and separate rules may be created for GPRS to Arctic, GRPS to LAN and LAN to GPRS.

**Arctic™ Configurator**

**System** | Network | Firewall | Services | Applications | Tools

**Enabled**  
 GPRS to Arctic  
 GPRS to LAN  
 LAN to GPRS

GPRS to Arctic Firewall settings			
Use GPRS to Arctic Firewall <span style="float: right;">Yes</span>			
Action	Protocol	From IP	Destination port
ACCEPT	ICMP	0/0	
ACCEPT	TCP	0/0	80
ACCEPT	TCP	0/0	22
ACCEPT	TCP	0/0	23
ACCEPT	TCP	0/0	2402
ACCEPT	TCP	0/0	2404
ACCEPT	TCP	0/0	504
NO RULE	ANY		
NO RULE	ANY		
NO RULE	ANY		

## Service Menu

### WWW

These settings enable or disable the web server functionality.

**Web Server** – Disables or enables the www server.

**Web Configuration Access** - Disables or enables web configuration access.

Arctic GPRS Gateway

23

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**Note:** If you disable the web access settings, web configurator stops functioning and you will have to enable it via console if you should need to use it again later.

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## SSH

SSH server is available in Arctic for secure connections. Configuration file located at `/etc/sshd_config` may be edited manually.

**SSH Server** – Enables or disables the SSH server.

## Telnet

Telnet server may be used to make terminal connections to the Arctic device shell. A more secure way of performing remote management is based on the SSH.

**Telnet server**- Enables or disables the telnet server.

## DHCP

DHCP server listens to broadcast DHCP queries and assigns IP address for host from the configured pool. If needed, Arctic can act as a DHCP server. This is suitable for small remote networks that have for example few laptops connected to the Arctic via an Ethernet hub or a switch.

**DHCP Server** – Enables or disables the DHCP server.

DHCP Server Settings	
DHCP Server	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled
<b>Mandatory parameters</b>	
Subnet	<input type="text" value="10.0.0.0"/>
Netmask	<input type="text" value="255.255.255.0"/>
Address range to share	
Low	<input type="text" value="10.0.0.10"/>
High	<input type="text" value="10.0.0.20"/>
<b>Optional parameters, leave blank if not used</b>	
Subnet mask	<input type="text" value="255.255.255.0"/>
Domain name	<input exampledomain.com\""="" type="text" value="\"/>
DNS servers	<input type="text" value="10.0.0.2,10.0.0.3"/>
Default gateway	<input type="text" value="10.0.0.1"/>
Broadcast address	<input type="text"/>
Default lease time	<input type="text"/>
Max. lease time	<input type="text"/>
NTP server	<input type="text"/>
Lpr server	<input type="text"/>
WINS server	<input type="text"/>
<input type="button" value="Apply"/> <input type="button" value="Reset"/>	

---

**Note:** Configuring the DHCP server in an erroneous way may cause your network to function badly or may prevent functioning altogether. Consult your network administrator for necessary information **before** setting up the service.

---

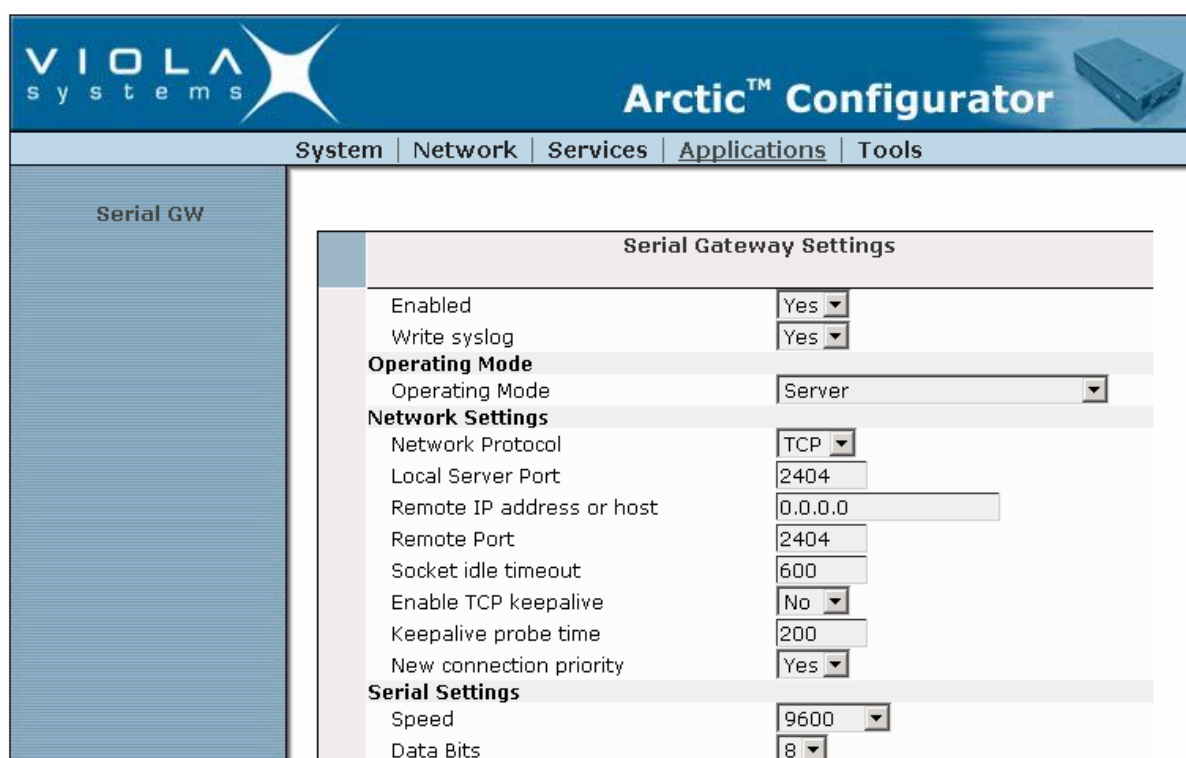
## Application Menu

Application menu contains the serial device server application. With this application serial devices can be connected to the Arctic Gateway and used over the TCP/IP network.

### Serial GW

Serial gateway can be enabled from this menu. When enabled in “Server” operation mode, TCP/IP (or UDP) connections can be made to the Arctic (Local Server Port). When Serial GW is in “Client” operation mode, Arctic Gateway sends the received serial data via TCP/IP to host (Remote IP Address or host) to remote host (Remote Port).

If only one serial device is connected to Serial GW, RS2 serial port is used. RS2 serial port can be used either as an RS-232 or an RS-485 type port. If two serial devices are needed, the console (RS1) port can be enabled when console switch is set to “0”.



The screenshot shows the Arctic Configurator web interface. The top navigation bar includes 'System', 'Network', 'Services', 'Applications', and 'Tools'. The 'Applications' tab is selected, and the 'Serial GW' sub-tab is active. The main content area displays the 'Serial Gateway Settings' form. The form is divided into sections: 'Enabled' (Yes), 'Write syslog' (Yes), 'Operating Mode' (Server), 'Network Settings' (TCP, Local Server Port: 2404, Remote IP address or host: 0.0.0.0, Remote Port: 2404, Socket idle timeout: 600, Enable TCP keepalive: No, Keepalive probe time: 200, New connection priority: Yes), and 'Serial Settings' (Speed: 9600, Data Bits: 8).

Serial Gateway Settings	
Enabled	Yes
Write syslog	Yes
<b>Operating Mode</b>	
Operating Mode	Server
<b>Network Settings</b>	
Network Protocol	TCP
Local Server Port	2404
Remote IP address or host	0.0.0.0
Remote Port	2404
Socket idle timeout	600
Enable TCP keepalive	No
Keepalive probe time	200
New connection priority	Yes
<b>Serial Settings</b>	
Speed	9600
Data Bits	8

For example, a device connected to an Arctic GW application (when in server operation mode) serial port could be accessed with telnet utility as follows:

```
telnet <Arctic IP Address> 2404
```

## Tools Menu

The Tools menu provides the access to web based tools used for troubleshooting with the Arctic. It is possible to execute simple shell commands through the Web console. Also GPRS information can be obtained from “Modem Info” menu.

### Default settings

Arctic may be set to factory default settings from the Tools menu. This restores factory settings excluding network settings.

## 6. I/O Interface (optional)

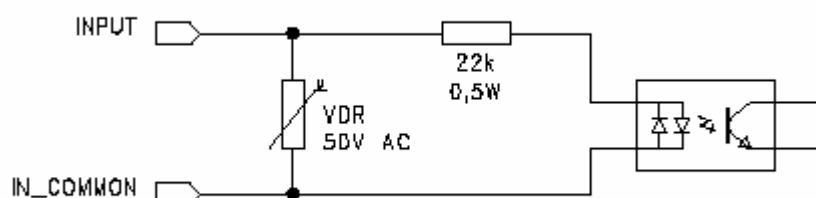
This chapter describes the hardware and related software (for interface extensions).

There are two types of I/O boards:

- IO-8-2            8 general purpose digital inputs, 2 digital outputs
- IO-8-1-1        8 general purpose digital inputs, 1 digital output and 1 analog input for voltage measurement or monitoring

### Digital Inputs (IO-8-2 and IO-8-1-1 only)

For general purpose digital I/O interfacing the Arctic includes eight digital inputs which all share a common reference pin. The inputs are optically isolated and work with AC voltage levels from 5 to 60 V and this range is guaranteed to be interpreted as a logical high state. AC voltage levels less than 2 V are interpreted as a logical low state. The schematic of one digital input is shown in the figure below.



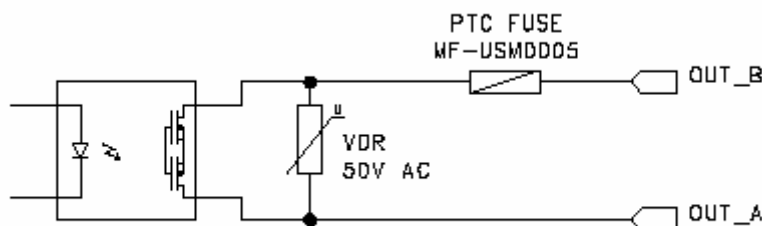
In the figure *INPUT* refers to one of the eight *Digital Input n* -pins and *IN\_COMMON* refers to *Digital Input Common* -pin in the I/O connector's pin description table shown below:

Pin #	8-1-1 model	8-2 model (default)
1	DC out	DC out
2	Digital input 1	Digital input 1
3	Digital input 2	Digital input 2
4	Digital input 3	Digital input 3
5	Digital input 4	Digital input 4
6	Digital input 5	Digital input 5
7	Digital input 6	Digital input 6
8	Digital input 7	Digital input 7
9	Digital input 8	Digital input 8
10	Digital input common	Digital input common
11	Digital output 1A	Digital output 1A
12	Digital output 1B	Digital output 1B
13	Analog input 1+	Digital output 2A
14	Analog input 1-	Digital output 2B
15	DC GND	DC GND

### Digital Outputs (IO-8-2 and IO-8-1-1 only)

The digital outputs of the Arctic are optically isolated and can be used for controlling low current external devices. The output is a CMOS relay which is protected by a PTC type fuse. The output is capable of handling a continuous current of 50 mA maximum at an ambient temperature of 20°C. In

these conditions the output relay ON resistance together with the resistance of the fuse is typically about 50  $\Omega$  which results in a 2.5 V loss across output pins with a full load current of 50 mA. The output schematic is shown in the figure below.



In the figure *OUT\_A* and *OUT\_B* refer to *Digital Output nA* and *Digital Output nB* pins, respectively, in the I/O connector.

---

**Note:** Absolute maximum voltage across digital output pins is 30 V. Voltage levels above this value may cause permanent damage to the PTC fuse.

---

## DC Output

The input voltage to the DCIN connector is circulated back to the I/O connector of the Arctic. See the I/O connector's pin description table shown in Chapter 6. This DC output can be used, for example, together with digital outputs in order to simplify external circuitry and wiring.

## Analog Input (IO-8-1-1 only)

The Arctic models with an optional analog input have a 12-bit A/D converter. The input is galvanically isolated and is capable of measuring analog signals up to 60 V, making it ideal for general purpose voltage measurement or control.

The analog input is unipolar and the pins are designated as *Analog Input+* and *Analog Input-* in the I/O connector's pin description table shown in Chapter 3.

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**Note:** Although the input is protected against reverse polarity and overvoltage the inputs should not be subjected to voltages exceeding the specified 0 to 60 V range. The absolute maximum voltage between input pins is  $\pm 100$  V.

---

## 7. GPRS

The Arctic GPRS Gateway provides a direct and reliable GPRS connection and data transmission to stationary or E-GSM 900/1800 mobile networks around the world.

In this Chapter the specialities related to GPRS operation are described.

### Placing Arctic GPRS

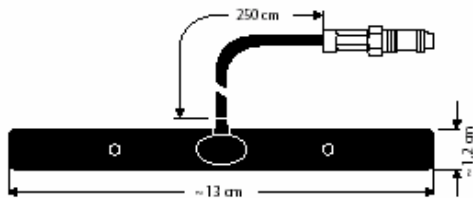
When choosing the installation site of Arctic models with the GPRS option, please remember that it uses radio waves for data transmission. The surrounding environment affects the behavior of radio signals. Therefore, if you are using an Arctic with the antenna mounted directly to the antenna connector (without an extension cable), try to avoid placing the unit in a location where the radio signal might be shadowed by nearby obstacles. Note also that large metallic surfaces (racks) or walls with metallic structures (cabling, concrete iron) may highly degrade the antenna performance. In case of metal racks or surfaces it is recommended to use an external antenna with an appropriate cable. This allows placing of the Arctic more freely.

### GPRS Antenna

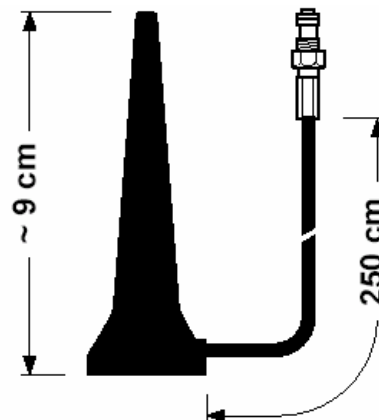
The Arctic with GPRS includes a FME connector (male type) for an external antenna. It is possible to use any kind of external 50  $\Omega$  dual-band antenna intended for GSM900 (880–960 MHz) and GSM1800 (also known PCN) (1710–1880 MHz) frequency bands. Connect the antenna directly to the connector provided for the antenna on the back panel of the Arctic unit.

Typically, commercially available antennas are provided with a flexible 50  $\Omega$  cable having a length of 2–3 meters and having a female type FME-connector.

The Arctic GPRS Gateway is tested with antennas from Hirschmann Rheinmetall Elektronik GmbH. Examples of tested external antennas include the following sticker-type and magnetic mount antennas shown below:



MCA 18 90 STRIPE, sticker type patch antenna (above), and MCA 18 90 MH, magnetic mount antenna (right). Both antennas have a FME (female) connector and L=250 cm RG174 cable.



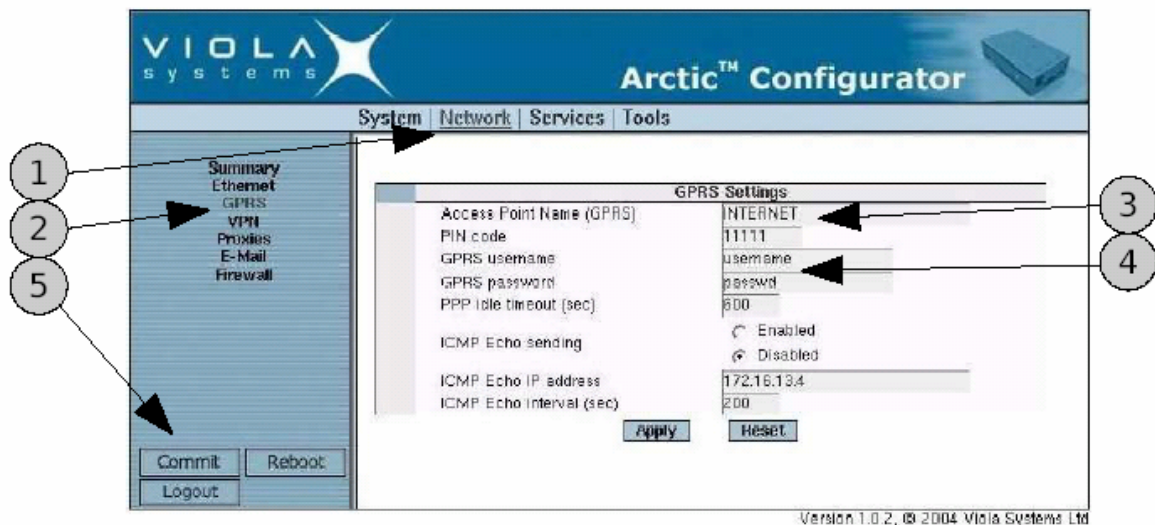
## SIM Card and Card Holder

Standard 3 V SIM cards may be used with the Arctic GPRS Gateway. A SIM card holder is located on the back panel near the GPRS antenna connector. If you have the PIN code query enabled, first check that the Arctic Configurator has a correct PIN code entered in the GPRS submenu. To operate with SIM card follow the procedure below:

1. Power off the Arctic.
2. The SIM card holder contains a tray with a yellow eject button. Push this button in order to eject the tray from the holder.
3. Put the SIM card onto the tray.
4. Insert the tray carefully back to the holder and press the tray until it is locked.

**Note:** The card should only be inserted or removed while the GSM module has been placed in shutdown mode. The SIM card holder has a card detection circuit that will in theory allow hot insertion and removal of the card. However, hot insertion and removal are not recommended, since the SIM card content may be corrupted if the card is removed while the GSM module is writing data to it.

## Configuring Arctic GPRS Settings



1. If your SIM card has the PIN code querying set, make sure you configure the PIN code before inserting the card in the card holder. If PIN querying is not set, you may proceed with the card installation procedure.
2. Connect to the Arctic and log in to Configurator.
3. Navigate to Network page from main navigation bar and select the GPRS sub page.
4. Set the access point name appropriately (usually "INTERNET").
5. Set the GPRS network username and password appropriately if your GPRS service requires authentication.

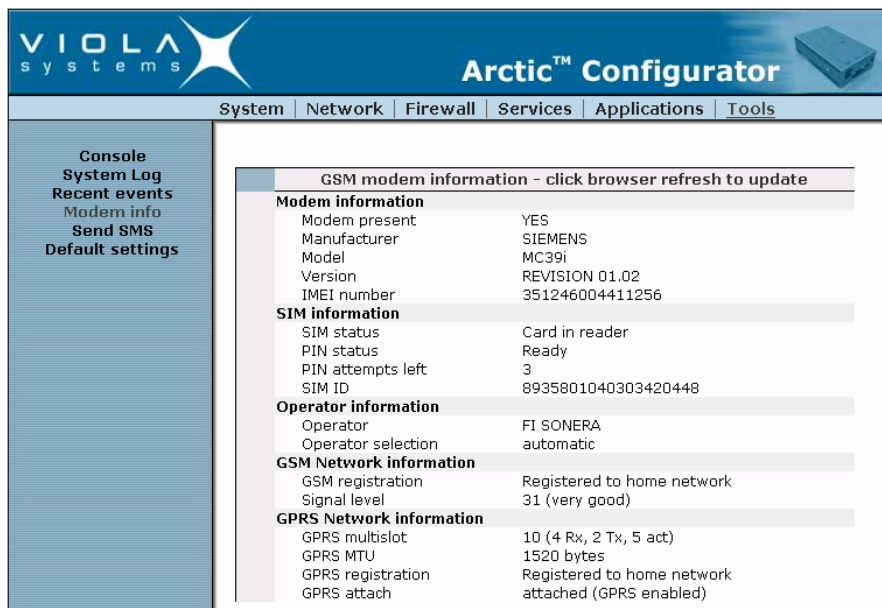
6. Set default route to *enabled*.
7. Optionally, set the PIN code and PPP idle timeout.
  - If your SIM card has the PIN code set, type the code into the PIN code field.
  - PPP idle timeout defines the time in seconds how often the Arctic resets the GPRS connection if the connection is idle.
  - ICMP Echo is used to monitor GPRS connection between Arctic and a remote host. If the designated host cannot be reached the GPRS connection is reset. This feature can be enabled from Network/Monitor menu.
8. Finally click **Apply** and then **Commit** to store the settings.

Reboot the Arctic for the settings to take effect. Check GPRS status from Network/Summary Menu.

**Note:** If the PIN code querying is enabled on the SIM card and the PIN code is entered wrongly three (3) times, the card locks up and will then require that an additional code is to be entered to open the card from locked state. It is thus important to set the code with the Arctic Configurator before plugging the SIM card in.

## Useful GSM/GPRS Information

Useful GSM/GPRS information can be obtained from Tool/Modem Info Menu:



The screenshot shows the Arctic Configurator software interface. The top bar includes the Viola Systems logo and the title 'Arctic™ Configurator'. Below the title is a navigation menu with tabs: System, Network, Firewall, Services, Applications, and Tools. On the left side, there is a sidebar with links: Console, System Log, Recent events, Modem info, Send SMS, and Default settings. The main content area displays 'GSM modem information - click browser refresh to update'. This section contains several sub-sections with their respective details:

GSM modem information - click browser refresh to update	
<b>Modem information</b>	
Modem present	YES
Manufacturer	SIEMENS
Model	MC39i
Version	REVISION 01.02
IMEI number	351246004411256
<b>SIM information</b>	
SIM status	Card in reader
PIN status	Ready
PIN attempts left	3
SIM ID	8935801040303420448
<b>Operator information</b>	
Operator	FI SONERA
Operator selection	automatic
<b>GSM Network information</b>	
GSM registration	Registered to home network
Signal level	31 (very good)
<b>GPRS Network information</b>	
GPRS multislot	10 (4 Rx, 2 Tx, 5 act)
GPRS MTU	1520 bytes
GPRS registration	Registered to home network
GPRS attach	attached (GPRS enabled)

## Troubleshooting

This Chapter provides a list of the common problems encountered while installing, configuring or administering the Arctic. If you are unable to resolve your problem, refer to the Warranty and Technical Support Sections at the end of this User's Guide for information about contacting Viola Systems Technical Support representatives.

### Common Problems

#### Problem #1

Q: Console does not receive characters.

A: Disable HW and SW handshaking from your terminal software (e.g. Hyperterm or Minicom).

#### Problem #2

Q: GPRS interface is up but no traffic flows through it.

A: Default gateway in Ethernet settings submenu has to be set as "0" and also default gateway has to be enabled from Network/GPRS menu when using GPRS interface as the default gateway

#### Problem #3

Q: GPRS connection is not established.

A: Check that the SIM card has the correct PIN number settings and that it has not been locked after a wrong number was entered three times successively. PIN status can be checked from Tools/Modem Info menu.

#### Problem #4

Q: GPRS connection is ended after approximately two minutes.

A: You have enabled connection checking from Network/Monitor menu but not set the correct IP to GPRS "ICMP Echo settings".

## Technical Specifications

Processor	32-bit 48 MHz RISC Processor
Memory	32 MB RAM 8 MB Flash ROM
Network Interface	10/100 Base-T. Shielded RJ45 Ethernet (IEEE 802.3) 1.5 kV isolation transformer
Serial Device Interface	2 x Male DB9 connector DTE, 15kV ESD and short circuit protection Full serial and modem signals Speed: 300–460800 bit/s Data bits: 7 or 8; Stop bits: 1 or 2 Parity: None, Even, Odd Flow control: None, RTS/CTS  Console port / application port 1: Console: RS-232, 19200 bit/s, 8 data bit, 1 stop bit, no parity  Application port 2: Serial port selectable: RS-232 or RS-422/485
Power Requirements	6 – 26 VDC, less than 500 mA (1–4 W power consumption) Resettable fuse and ESD protected input External 110–230 VAC adapter (optional)
Temperature Range	Operating: –20 to 55 °C Storage: –30 to 85 °C
Relative Humidity	Operating: 5 to 85 % RH non-condensing
Operating System	µCLinux embedded multitasking operating system
Network Protocols Supported	PPP, IP, ICMP, UDP, TCP, ARP, DNS, DHCP, FTP, TFTP, HTTP
Tunneling (VPN)	SSH-VPN client (requires Viola M2M Gateway) SSHv2 server and client SSHv1 server and client
Management	WWW, SSH, Telnet and console FTP, TFTP and HTTP software update
Routing and Firewall	Static routing, proxy ARP, port forwarding, IP masquerading/NAT, firewall
Serial Device Connectivity	Device server application (Serial GW) Simultaneous GPRS, CSD and SMS SMS configuration and status reporting
Dimensions and Weight	Models in aluminum frame: Size: 180 mm × 110 mm × 45 mm (W×L×H) Weight: 0.7 kg Attachment rail for optional and custom mounting

### Absolute Maximum Ratings for I/O Interface

Input power	+24 V
Digital inputs (optional)	60 V DC referring to common digital input pin
Digital outputs (optional)	30 V between output pins
Analog input (optional)	±100 V between input pins

## Limited Warranty

### Coverage

Viola Systems warrants this hardware product to be free from defects in materials and workmanship for the warranty period. This non-transferable, limited warranty is only to you, the first end-user purchaser. The warranty begins on the date of purchase and lasts for the period specified below:

Arctic GPRS Gateway

one (1) year

### Excluded Products and Problems

This warranty does not apply to: (a) Viola Systems software products; (b) expendable components such as cables and connectors; or (c) third party products, hardware or software, supplied with the warranted product. Viola Systems makes no warranty of any kind on such products which, if included, are provided "AS IS." Excluded is damage caused by accident, misuse, abuse, unusually heavy use, or external environmental causes.

### Remedies

Your sole and exclusive remedy for a covered defect is repair or replacement of the defective product, at Viola Systems' sole option and expense, and Viola Systems may use new or refurbished parts or products to do so. If Viola Systems is unable to repair or replace a defective product, your alternate exclusive remedy shall be a refund of the original purchase price.

The above is Viola Systems' entire obligation to you under this warranty. IN NO EVENT SHALL VIOLA SYSTEMS BE LIABLE FOR INDIRECT, INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, USE, OR PROFITS EVEN IF VIOLA SYSTEMS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. In no event shall Viola Systems' liability exceed the original purchase price of the device server. Some states or countries do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

### Obtaining Warranty Service

You must notify Viola Systems within the warranty period to receive warranty service. During the warranty period, Viola Systems will repair or replace, at its option, any defective products or parts at no additional charge, provided that the product is returned, shipping prepaid, to Viola Systems. All replaced parts and products become the property of Viola Systems. Before returning any product for repair, customers are required to contact the Viola Systems.

## Technical Support

### Contacting Technical Support

Phone: +358 20 1226 226  
Fax: +358 20 1226 220  
E-mail: [support@violasystems.com](mailto:support@violasystems.com)  
Internet: <http://www.violasystems.com>

### Recording Arctic Information

Before contacting our Technical Support staff, please record (if possible) the following information about your Arctic product:

**Product name:** \_\_\_\_\_

**Serial no:** \_\_\_\_\_

Note the status of your Arctic in the space below before contacting technical support. Include information about error messages, diagnostic test results, and problems with specific applications.

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